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# UK Patent Application (12) GB (19) 2 317 555 (13) A

(43) Date of A Publication 01.04.1998

(21) Application No 9620206.4

(22) Date of Filing 27.09.1996

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(51) INT CL<sup>6</sup>  
A46B 15/00, A61C 17/34

(52) UK CL (Edition P)  
A4K KBC  
ASR RHAS

(56) Documents Cited  
GB 2030855 A EP 0685183 A2 EP 0417963 A1  
EP 0357852 A1 EP 0324120 A1 US 5504959 A

(58) Field of Search  
UK CL (Edition O) A4K KBC KBX KFX  
INT CL<sup>6</sup> A46B 15/00, A61C 17/00 17/16 17/32 17/34  
Online: WPI

## (54) Combined electrical and ionic toothbrush

(57) A combined electrical and ionic toothbrush having a handle (10) housing a motor (11) and battery (12). An electrically conductive drive shaft (16) extends to a toothbrush head (14), and is arranged to move an array of bristles (15) relative to the brush head in a normal manner. An exposed pad (19) electrically connected to the positive pole of the battery (12) is contacted in use to the users palm. The negative pole of the battery (12) is connected via a rotor (18) of the motor (11) and the drive shaft (16) to provide a series electrical path for the current to flow thereby applying a negative potential to the teeth when the aperture (25) is filled with water and/or saliva. A return path for the current is provided via the users body and the pad (19).

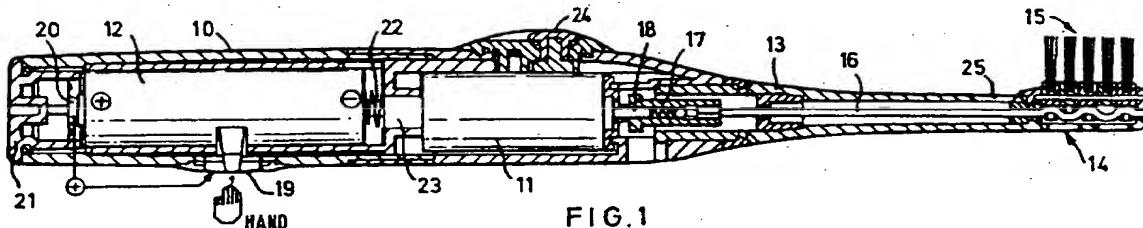
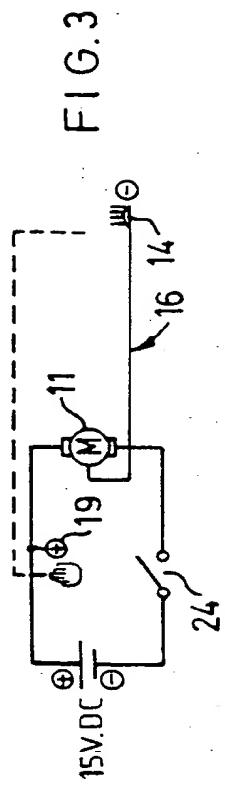
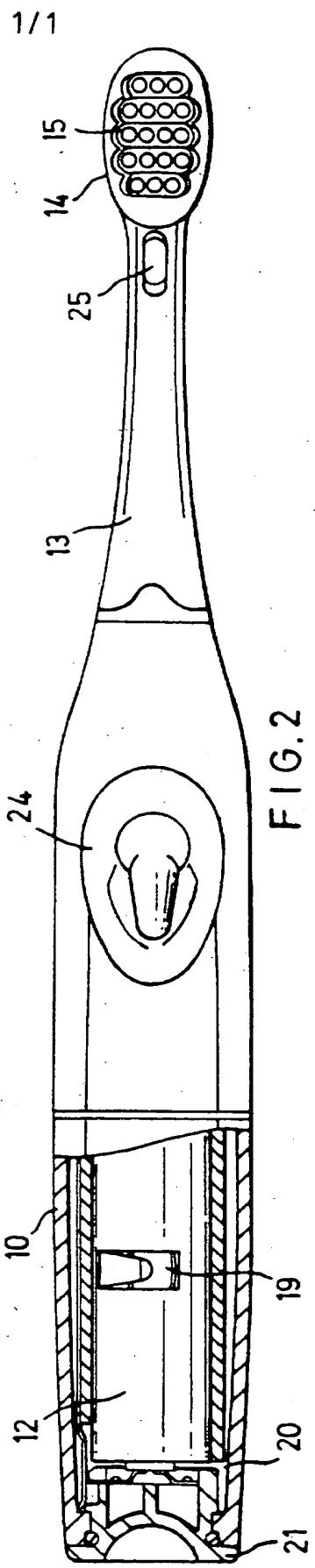
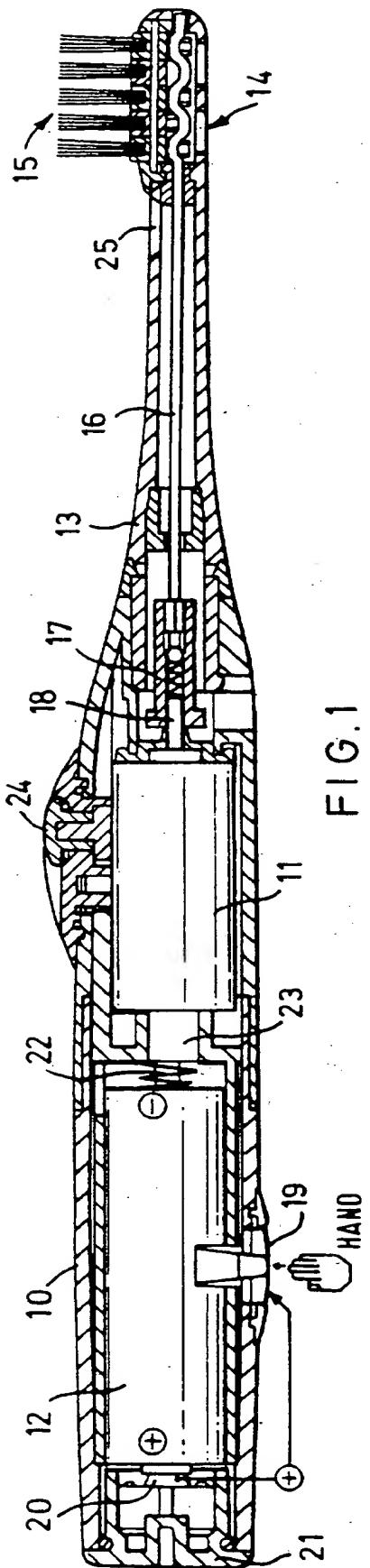


FIG.1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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TOOTHBRUSHES

The invention relates to toothbrushes.

The invention relates more particularly to battery operated electrical toothbrushes that have bristles mounted in a toothbrush head and a handle arranged to incorporate a battery and an electric motor. A shank extends between the handle and the toothbrush head and a drive shaft extends along inside the shank that is arranged to move the bristles so as to cause the bristles to vibrate and/or rotate as appropriate. Various toothbrushes of this kind are well known.

It is also known to provide non-driven toothbrushes having relatively stationary brush heads and static bristles in which low voltage, 1 to 5 volts say, direct current is applied via the toothbrush to teeth and gums during use. An applied negative potential serves to improve cleaning and cleansing and especially aids the removal of plaque from the teeth. Such toothbrushes are known as "Ionic toothbrushes".

It is an object of the invention to provide a combined electrical operated and Ionic toothbrush.

According to the invention there is provided a combined electrical ionic toothbrush having a handle incorporating

a direct current electrical motor and arranged to house  
a battery, a shank extending from the handle to a  
toothbrush head supporting bristles mounted for relative  
movement on the head, and an electrical conductive drive  
5 shaft extending from the motor arranged to move the  
bristles relative to the head, in which an electrical  
circuit is formed to provide a series path for direct  
current to flow from the battery via a user's hand when  
gripping the handle and the toothbrush head which path  
10 includes a rotor of the motor and the drive shaft so that  
a negative potential is applied to the teeth during  
normal use of the toothbrush.

The toothbrush may include an exposed conductive pad  
mounted on a surface of the handle, arranged to be  
15 permanently electrically coupled to a positive pole of  
the battery, that contacts a user's hand during use of  
the toothbrush.

One end of the rotor of the motor, opposite to the end  
coupled to the drive shaft, is preferably arranged to be  
20 electrically coupled to a negative pole of the battery.

A separate electrically conductive mechanical coupling  
may be provided connecting the opposite end of the rotor  
to the drive shaft.

A toothbrush according to the invention will now be

described by way of example with reference to the accompanying drawings in which:-

Figure 1 is a sectional side view of the toothbrush;

5       Figure 2 is a part-sectional bottom view of the toothbrush; and

Figure 3 is a schematic circuit diagram of the toothbrush.

Referring to the drawings, in Figures 1 and 2, the toothbrush comprises a handle 10 in which is housed a  
10      direct current electrical motor 11 and a battery 12. A shank 13 extends from the handle 10 to a toothbrush head 14 in which is mounted an array of bristles 15. An electrically conductive drive shaft 16 extends along inside the shank 13 from the motor 11 to the toothbrush  
15      head 14 and is cranked at its remote end as shown. An electrically conductive coupling 17 couples the drive shaft to a rotor 18 of the motor 11 and during normal use rotation of the shaft by the motor causes the bristles to move up and down, as viewed in Figure 1.

20      An exposed metal pad 19 is mounted on an underside of the handle 10 which is electrically coupled (as shown diagrammatically in Figure 1) to a terminal 20. in an end cap 21, that presses against a positive pole of the

battery 12. A negative pole of the battery 12 is electrically connected to the one end of the rotor 18 via a conductive spring 22 and a bearing 23. Where the motor has a rotor that is exposed at both ends, the spring 22 or other connector may bear directly on one end of the rotor. An ON-OFF switch 24 is mounted on a topside of the housing 10 for operating the motor 11 as required.

In Figure 3, the electrical circuit shows the motor 11, the toothbrush head 14, the pad 19 and the switch 24. A direct current series path is provided by the rotor 18, the coupling 17 and the drive shaft 16 to the toothbrush head 14. Via this path a negative potential is applied to the toothbrush head and in use, via saliva for example, to teeth of the user. A current return path, shown dotted, extends via a palm of the hand in contact with the pad 19 and the body of the user. In this way during normal operating of the toothbrush, the combined benefit provided by the action of the electrically driven bristles and the application of a negative potential to the surfaces of the teeth is achieved.

It will be appreciated that the actual form of the "electric toothbrush" can be varied. That is to say, the ionic aspect can be combined with so-called "electrical toothbrushes" where the bristles are vibrated, and/or rotated for example in other configurations, provided that the drive shaft is arranged to form a path for a low

voltage direct as required to connect the battery to an output adjacent the toothbrush head 14. For applying an electrical potential to the teeth, it is normally sufficient, as illustrated in Figures 1 and 2, to have an aperture 25 in the shank 13 adjacent the toothbrush head 14 so as to expose a remote end of the drive shaft 16. The aperture 25 allows water, and particularly saliva, to make contact with the drive shaft 16 which completes a current path from the shaft to the surfaces of the teeth.

CLAIMS

1. A combined electrical ionic toothbrush having a handle incorporating a direct current electrical motor and arranged to house a battery, a shank extending from the handle to a toothbrush head supporting bristles mounted for relative movement on the head, and an electrical conductive drive shaft extending from the motor arranged to move the bristles relative to the head, in which an electrical circuit is formed to provide a series path for direct current to flow from the battery via a user's hand when gripping the handle and the toothbrush head which path includes a rotor of the motor and the drive shaft so that a negative potential is applied to the teeth during normal use of the toothbrush.
- 10
- 15
2. A toothbrush according to claim 1, including an exposed conductive pad mounted on a surface of the handle, arranged to be permanently electrically coupled to a positive pole of the battery, that contacts a user's hand during use of the toothbrush.
- 20
3. A toothbrush according to claim 1 or 2, in which one end of the rotor of the motor, opposite to the end coupled to the drive shaft, is arranged to be electrically coupled to a negative pole of the battery.
4. A toothbrush according to any of claims 1 to 3.

including a separate electrically conductive mechanical coupling connecting the opposite end of the rotor to the drive shaft.

5. A toothbrush substantially as herein described with reference to the accompanying drawings.



Application No: GB 9620206.4  
Claims searched: 1-4

Examiner: Steven McIlroy  
Date of search: 29 October 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A4K (KBC, KBX, KFX)

Int Cl (Ed.6): A46B 15/00 A61C 17/00, 17/16, 17/32, 17/34

Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X, Y	GB 2030855 A (Rowenta-Werke GmbH) See whole document	X: 1-4 Y: 1-4
Y	EP 0685183 A2 (Hukuba et al.) See especially figures 1-3 & lines 30-43 in column 8	1-4
Y	EP 0417963 A1 (Hukuba et al.) See especially figures 1-3 & line 30 in col. 3 to line 44 in col. 4	1-4
Y	EP 0357852 A1 (Wang et al.) See especially figures & lines 23-54	1-4
Y	EP 0324120 A1 (Taihei) See especially figure 1 and abstract	1-4
Y	US 5504959 A (Yukawa et al.) See especially the motor (42) and rotator (1) in figure 2.	1-4

- X Document indicating lack of novelty or inventive step  
 Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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- A Document indicating technological background and/or state of the art.  
 P Document published on or after the declared priority date but before the filing date of this invention.  
 E Patent document published on or after, but with priority date earlier than, the filing date of this application.